

## Europa's Thermal Emission

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Ground based telescopic observations of Europa at 8.7, 12.5, and 20  $\mu\text{m}$  were taken between July 13 and November 4, 1998 at the NASA Infrared Telescope Facility.

Europa's thermal emission has a relatively large amplitude light curve with a maximum around 345 W longitude and a minimum around 100 W longitude. The amplitudes of the observed emission was 0.0505 to 0.0111  $\text{Wm}^{-2}\mu\text{m}^{-1}$  at 8.7  $\mu\text{m}$ ; 0.0526 to 0.189  $\text{Wm}^{-2}\mu\text{m}^{-1}$  at 12.5  $\mu\text{m}$ ; and 0.185 – 0.413  $\text{Wm}^{-2}\mu\text{m}^{-1}$  at 20  $\mu\text{m}$ . A single eclipse was observed at roughly 350 W longitude with emission levels of 0.0055  $\text{Wm}^{-2}\mu\text{m}^{-1}$  at 8.7 $\mu\text{m}$ , 0.020  $\text{Wm}^{-2}\mu\text{m}^{-1}$  at 12.5  $\mu\text{m}$ , and 0.114  $\text{Wm}^{-2}\mu\text{m}^{-1}$  at 20  $\mu\text{m}$ .

We modeled Europa's infrared orbital light curve for two cases using a spatially resolved albedo map based on Voyager data. The best fits for a single thermal inertia was  $8 \times 10^{-4} \text{ cal}/(\text{cm}^2 \text{ s}^{1/2} \text{ K})$  but this model was not able to match the amplitude of the light curve. Good fits for the 12.5 and 20  $\mu\text{m}$  curves were made using two thermal inertias tied to albedo. High albedo (i.e.  $>0.6$ ) units had values of  $1.4 \times 10^{-3} \text{ cal}/(\text{cm}^2 \text{ s}^{1/2} \text{ K})$  while a value of  $4.0 \times 10^{-4} \text{ cal}/(\text{cm}^2 \text{ s}^{1/2} \text{ K})$  was used for the low albedo units. However, the measured thermal emission at 8.7 $\mu\text{m}$  is in excess and more thermal emission was observed in eclipse at all wavelengths than expected from these preliminary thermal models. Further modeling and the implications of these results for Europa's thermophysical properties, heat flow, and resurfacing will be presented.